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By-Chaffee, Everett

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This booklet was prepared to assist teachers of elementary school mathematics in the effective use of the basic and supplementary state-adopted textbooks. Within each grade level, four categories of basic skills and understandings were developed. These were (1) number systems and numeration systems, (2) fundamental operations, (3) measurement, and (4) geometry. In some grade levels, geometry was omitted due to lack of textbook materials. Prerequisites to the skills and understandings are listed, as well as the pages where those topics would be introduced, reviewed, and/or extended. The topics listed represent only a minimum program in elementary school mathematics. (RR)

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GUIDELINES

FOR THE USE OF

BASIC AND SUPPLEMENTARY MATHEMATICS TEXTBOOKS

IN THE

ELEMENTARY SCHOOLS

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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LOS ANGELES CITY SCHOOLS
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FOREWORD

The material in this Instructional Bulletin has been prepared to assist teachers in the effective use of the basic and supplementary state-adopted textbooks in elementary school mathematics.

Charts have been prepared for each grade level B1--A6, which list in four categories the basic skills and understandings from the Course of Study for Elementary Schools, Los Angeles City Schools Publication No. 375, 1964 Revision. These are:

Number Systems and Numeration Systems
Fundamental Operations
Measurement
Geometry

The skills and understandings listed on the charts do not represent the entire elementary school mathematics program as found in the Course of Study for Elementary Schools, but, rather, a minimum program for most pupils at each grade level. With this framework as a guide, the teacher may then plan additional lessons to develop all facets of the instructional program in mathematics, as outlined in the Course of Study for Elementary Schools.

EVERETT CHAFFEE
Associate Superintendent
Division of Instructional Services

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GEORGE ARBOGAST
Elementary Mathematics Supervisor
Curriculum Branch

LAVON H. WHITEHOUSE
Elementary Curriculum Coordinator

AVERILL M. CHAPMAN
Administrator of Curriculum

APPROVED:

ROBERT J. PURDY
Associate Superintendent
Division of Elementary Education

EVERETT CHAFFEE
Associate Superintendent
Division of Instructional Services

CONTENTS

Foreword iii

Acknowledgments iv

Introduction vi

Reference Charts, Grade B1 1

Reference Charts, Grade A1 5

Reference Charts, Grade B2 9

Reference Charts, Grade A2 12

Reference Charts, Grade B3 16

Reference Charts, Grade A3 22

Reference Charts, Grade B4 26

Reference Charts, Grade A4 30

Reference Charts, Grade B5 33

Reference Charts, Grade A5 36

Reference Charts, Grade B6 40

Reference Charts, Grade A6 45

INTRODUCTION

On the following pages, each chart consists of three parts: prerequisites; skills and understandings; and a paged reference as to where these skills are either introduced, reviewed, or extended.

The prerequisite column identifies experiences, skills, or understandings that should be presented, either prior to or as a part of the lessons outlined in the textbook. It is generally assumed that pupils will be familiar with the material of the preceding grade level before attempting to work with a skill at a new grade level.

The second column lists the basic skills and understandings that are found in the Course of Study for a particular grade level. The word "skills" involves reading and writing numerals, as well as the development of facility in computation. The word "understandings" refers to the generalizations and principles that are found in a mathematics program which are an outgrowth of experiences in working with and understanding numbers of all kinds.

The third column lists the pages where the particular skill is first introduced to the pupil in an elementary school. The teacher should note that a reference in this column indicates something new to be learned. If the column is blank, then most of the textbook material is a review or extension of what has been taught previously.

The fourth column lists the pages of additional material that can be used for review or drill of a particular skill or understanding. A second function of this section is the listing of pages that extend the skills or understandings that have been taught previously. Problems of increasing complexity are included in this category.

The references listed do not constitute all of the pages or lessons that are in the textbooks, nor is it intended that pupils should be required to complete all of the pages that are listed. The teacher assigns or deletes particular lessons, according to the needs of the pupils.

In some sections there are specific skills or understandings that are mentioned, but no pages are listed. Such skills or understandings have been listed to alert the teacher to the fact that they should be emphasized as a part of the instructional program.

Some topics have been marked as optional for a particular grade level. These are to be taught only to those pupils that show a readiness for these skills and understandings. Optional topics may be considered as basic topics at the next grade level. The listing of optional topics reduces the content of the instructional program for most pupils.

Problem solving lessons have been included in the review and/or extension section. This is an important phase of the instructional program and should receive regular attention prior to and following the development of the related computational skills.

In some grade levels, the geometry category has been left out, since there was not adequate material in the textbook for that grade level. It is suggested that the teacher review the geometry material from the previous grade when this omission occurs.

The basic and supplementary textbooks used as references in this bulletin refer to the pupil editions of the following books.

Grade 1: Greater Cleveland Mathematics Program, Book 1 (Basic)
Modern Arithmetic Through Discovery, Book 1 (Supplementary)

Grade 2: Greater Cleveland Mathematics Program, Book 2 (Basic)
Modern Arithmetic Through Discovery, Book 2 (Supplementary)

Grade 3: Greater Cleveland Mathematics Program, Book 3 (Basic)
Modern Arithmetic Through Discovery, Book 3 (Supplementary # 1)
Math Workshop for Children, Level C (Supplementary # 2)

Grade 4: Modern Arithmetic Through Discovery, Book 4 (Basic)
Math Workshop for Children, Level D (Supplementary)

Grade 5: Modern Arithmetic Through Discovery, Book 5 (Basic)
Math Workshop for Children, Level E (Supplementary)

Grade 6: Modern Arithmetic Through Discovery, Book 6 (Basic)
Math Workshop for Children, Level F (Supplementary)

REFERENCE CHARTS, GRADE B1

NUMBER SYSTEMS AND NUMERATION SYSTEMS

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
	MATHEMATICAL UNDERSTANDINGS				
Pupils should have experiences with - rote counting to develop number names - matching objects in one-to-one correspondence - recognizing sets of objects	The meaning of whole numbers 1-9	5, 7, 11, 17, 21, 23, 31, 37, 43, 47, 49	1, 4	6, 8, 10, 12, 14, 18, 19, 22, 24, 32, 36, 38, 40, 44, 48, 50, 51, 52, 53	11, 14, 15, 16
	10	59	18	60, 61, 62	
	0	67	3	68, 69, 72	
	*11-50	121, 144, 145	18, 25	120, 122, 143, 146	25, 37
	Many names for a number	9, 13, 19, 23, 28, 35, 39, 47, 53, 61		70	
	Ordinal numbers	73, 75	17	74, 76	
	* Place value in ten's place	117, 144		122, 124, 146, 156, 157, 158	
	* Expanded notation to rename numbers: 11-50	121		122, 144, 146, 157, 158	
	Comparing numbers	25, 26		63, 64, 167, 168	

* OPTIONAL TOPICS FOR THIS GRADE

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
NUMBER SYSTEMS AND NUMERATION SYSTEMS	Pupils should have - motor coordination sufficiently developed for successful writing of numerals - an understanding of the meaning of each number prior to the introduction of the numeral - experiences in rote counting to learn the number names	MATHEMATICAL SKILLS				
		Reads and writes numerals 1-9	6, 8, 11, 12, 18, 22, 24, 32, 38, 44, 50	2, 3, 5, 6, 8, 9	12, 13, 14, 15, 16, 20, 27, 28, 33, 34, 39, 40, 41, 42, 45, 46, 48, 51, 52, 54, 57, 58, 69	7, 12, 16
		0	68	10		
		10	117		118, 119, 120	
		*11-50	121, 144, 156	25	120, 123, 124, 143, 146, 158	37, 44, 45, 53, 104, 129
		Counts by ones to 50	57, 123, 158	1	58	11, 12, 13, 124, 129
FUNDAMENTAL OPERATIONS	Pupils should have experiences with - combining and separating sets of objects - writing the numerals - understanding the meaning of the numbers 0-9	COMPUTATIONAL SKILLS				
		Addition facts with sums through 10	77, 78, 81, 95, 105, 106, 125, 135, 147, 159, 177	13, 20	79, 80, 81, 82, 83, 96, 97, 98, 111, 126, 136, 139, 148, 160, 162, 163, 169, 170, 178, 181, 182, 183, 184	14, 15, 21, 22, 23, 24, 40, 41, 42, 43, 68, 69, 71, 72, 74, 75, 76, 77, 84, 86, 87, 88, 95, 96, 97, 99, 100, 110, 111, 117, 120, 124, 131, 144

* OPTIONAL TOPICS FOR THIS GRADE

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
	COMPUTATIONAL SKILLS (Cont.)				
	Subtraction facts with minuends through 10	85, 86, 99, 112, 150, 162, 186	27, 28, 29	88, 89, 90, 91, 92, 128, 138, 169, 170, 183	32, 33,34, 35, 36,49, 50, 51,52, 68, 69,74, 75, 76,77, 86, 88,95, 96, 97,99, 100, 110, 111, 118, 121, 124, 131, 144
	Addition with three addends, no regrouping (carrying)	133	89	134, 141, 142, 153, 154, 171, 172	90, 96, 100, 111, 121, 132
FUNDAMENTAL OPERATIONS Pupils should understand - addition as a combining operation - subtraction as a separating operation	MATHEMATICAL UNDERSTANDINGS				
	Addition is commutative	78, 125, 131, 147, 159	84	79, 80, 81, 83, 84, 126, 132, 148, 151, 152, 166, 181	85, 86, 95, 96, 109, 117
	Addition and subtraction are inverse operations	86, 99, 107, 161, 179, 127, 131	57	93, 94, 100, 101, 102, 103, 104, 108, 109, 110, 129, 130, 137, 149, 151, 152, 164,166,179	58, 59,60, 63, 64,65, 77, 86,98, 109, 119
	Function of zero in addition and subtraction	115, 116			

	Prerequisites	Skills and Understandings	Introduction BASIC	Introduction SUPPL.	Review and/or Extension BASIC	Review and/or Extension SUPPL.
MEASUREMENT	Pupils should have experiences involving arbitrary units of measurement prior to the introduction of standard units of measurement.	MATHEMATICAL UNDERSTANDINGS				
		Measurement: liquid		55		
		Measurement: linear		56		91
		Measurement: time				
		Money Values		48, 79		78, 79
GEOMETRY	Pupils should have perceptual experiences involving: - likenesses - differences - repeated patterns	MATHEMATICAL UNDERSTANDINGS				
		Recognition of familiar shapes		73		

NUMBER SYSTEMS AND NUMERATION SYSTEMS

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
	MATHEMATICAL UNDERSTANDINGS				
Pupils should have experiences with: - rote counting to develop number names - recognizing sets of objects grouped by tens - comparing sets of objects	The meaning of whole numbers: 11-50	121, 144, 145	18, 25	120, 122, 143, 146 185-190, 302	
	50-99	173, 174, 176	18, 19, 25, 26, 37, 38	301-304, 309-312	
	Place value in ten's place	185-190	18, 19, 25, 30, 31, 37, 61, 62, 66, 67	301-304, 312	
	*Place value in hundred's place	325	114, 115		125, 126
	Expanded notation to rename numbers 11-99	185-188 301-304			
	Awareness of odd and even numbers	329, 330			
	The meaning of rational numbers one-half	297, 298	47, 124		136, 141
	one-third	300			
	one-fourth	299			
Pupils should have: - experiences writing the numerals 0-9 - an understanding of the meaning of each number prior to the introduction of the numeral - oral experiences using the number names	MATHEMATICAL SKILLS				
	Counts by ones to 100		18, 117		19, 26, 30
	Reads and writes numerals through 50	121, 144, 156, 158, 301		186, 188	5-10, 12, 44, 104, 129
	51-99	173-175, 309, 310	25, 26, 30, 45, 46	325-327, 328	31, 39, 46, 53, 54, 103, 139
	Compares numbers using <, >, =			204, 284	
* OPTIONAL TOPICS FOR THIS GRADE					

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
	MATHEMATICAL SKILLS (Cont.)				
	* Skip counts by twos to 50	329, 330			
	* Skip counts by fives to 100	331, 332			
	Skip counts by tens to 100	327	25, 26	328	
FUNDAMENTAL OPERATIONS	COMPUTATIONAL SKILLS				
Pupils should have experiences with - combining and separating sets of objects - addition and subtraction facts involving sums of 10 or less - writing the numerals 0-19	Addition facts with sums 11 through 18	227, 231, 243, 249, 273 279, 283		228, 229, 230, 232, 233, 234, 235, 236, 244, 245, 246, 247, 248, 250, 251, 252, 253, 254, 274, 275, 276, 280, 281, 282, 287, 289, 290	
- understanding the meaning of numbers beyond ten - counting from 10-20 - sequence of the numbers from 0-20	Subtraction facts with minuends 11 through 18	205, 206, 237, 239, 255, 257, 277, 283		209, 238, 240, 256, 258, 278, 289, 290	
	Addition, one-digit addend and a two-digit addend (no regrouping or carrying)	191, 192, 305		193, 194, 195, 196, 201, 203, 212, 306	
	Subtraction, one-digit numeral from a two-digit numeral (no regrouping or carrying)	205, 206		209, 210, 211, 212, 307, 308	

* OPTIONAL TOPICS FOR THIS GRADE

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
FUNDAMENTAL OPERATIONS	COMPUTATIONAL SKILLS (Cont.)				
	Addition, two-digit addends, (no regrouping or carrying)	313, 315	61, 62,81	314, 316, 317, 318, 324	83, 92,101, 112, 122, 133
	Subtraction, two-digit numeral from a two-digit numeral (no regrouping or carrying)	320, 321	66, 67	322, 323, 324	83, 93,101, 112, 122, 133
Pupils should have - an understanding of the meaning of addition and subtraction - experiences with basic addition and subtraction facts	MATHEMATICAL UNDERSTANDINGS				
	Addition and subtraction are inverse operations	207, 259, 285, 319	74, 75, 84, 85	208, 241,242, 260, 286	95, 96, 97
	Addition is commutative		74, 75, 84, 85		95, 96, 97
	Addition is associative		89	291	90
MEASUREMENT	MATHEMATICAL UNDERSTANDINGS				
Pupils should have experiences involving arbitrary units of measurement prior to the introduction of standard units of measurement.	* Measurement: liquid	295			102
	Measurement: time	261, 263	113, 135	262, 264,265, 266, 267	
	Money values	213, 217, 221		214, 215,216, 218, 219,220, 222, 223,224, 225, 226	123, 134
	Measurement: calendar	271, 272			
* OPTIONAL TOPICS FOR THIS GRADE	* Measurement: linear	293			

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
GEOMETRY		MATHEMATICAL UNDERSTANDINGS				
	Pupils should have perceptual experiences involving: - likenesses - differences - repeated patterns	Recognition of familiar shapes				

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
NUMBER SYSTEMS AND NUMERATION SYSTEMS	Pupils should have experiences with: - rote counting to develop number names - using concrete materials to show place value - comparing sets of objects - the sequential order of the numbers in the decimal system of numeration	MATHEMATICAL UNDERSTANDINGS				
		The meaning of whole numbers 0-99			6, 70, 72	4, 5, 11, 12
		Place value in ten's place			38, 70, 72, 110	4, 12, 19, 30, 31
		Expanded notation to rename numbers 11-99			38, 111, 114	
		Ordinal numbers through tenth				10
		The meaning of rational numbers: $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{3}{4}, \frac{2}{3}$	61-68	27, 64		
	Pupils should have - experiences writing the numerals 0-9 - an understanding of the meaning of each number before the numeral is introduced	MATHEMATICAL SKILLS				
		Counts by ones beyond 100		46		55, 56
		Reads and writes numerals through 99			37, 69, 70, 71, 74, 109, 110,111,113	2, 3, 5, 11, 12, 13, 19, 20, 30
FUNDAMENTAL OPERATIONS	Pupils should have experiences with - the addition and subtraction operations involving sums of 10 or less - reading and writing two-digit numerals - understanding the meaning of the numbers from 10-18 - counting from 0-20 - reading and writing mathematical sentences - the meaning of placeholders in a mathematical sentence	COMPUTATIONAL SKILLS				
		Addition facts, sums through 18			1-5, 27, 75, 76-78, 83, 84, 85, 86, 91, 92, 99	6-9, 21, 37, 57, 66, 77, 88, 99, 105, 106
		Subtraction facts with minuends through 18			9, 10, 11, 12, 79, 80, 87, 93	15-18, 22, 38, 66, 77, 88,105,106
		Adding a one-digit numeral to a two-digit numeral (no regrouping or carrying)			39-45, 48, 49, 115, 116, 117, 118, 119	
		Subtracting a one-digit numeral from a two-digit numeral (no regrouping or borrowing)	121, 122, 124		51, 52, 55, 121, 123, 125	

Prerequisites	Skills and Understandings	Introduction BASIC	Introduction SUPPL.	Review and/or Extension BASIC	Review and/or Extension SUPPL.
FUNDAMENTAL OPERATIONS	COMPUTATIONAL SKILLS (Cont.)				
	Adding two-digit addends	134, 135, 143	80, 81	127, 128, 131, 132, 133, 136, 139, 140, 141, 142	47, 61,92
	Subtracting a two-digit addend from a two-digit addend	137	82, 83	130, 138, 145, 146, 147	39, 40, 47
Pupils should have: - an understanding of the meaning of addition and subtraction - experiences in reading and writing mathematical sentences	MATHEMATICAL UNDERSTANDINGS				
	Addition is commutative		6	19, 20, 21	21, 37,57, 103
	Addition is associative			23,24,25,26, 103, 104	49, 50,51
	Addition and subtraction are inverse operations			7, 8, 13, 14, 22, 53, 54, 81,82, 88, 94, 98, 126, 129	23, 24,25, 26, 32, 33-35, 40, 48, 57,58, 59, 66-68, 78, 88, 89, 93, 100, 103
MEASUREMENT	MATHEMATICAL UNDERSTANDINGS				
Pupils should have experiences involving arbitrary units of measurement prior to the introduction of standard units of measurements.	Measurement: liquid			31, 33, 35, 36	53
	Measurement: calendar	155	41	153, 154, 156	
	Measurement: time	159-170 173-178	42		28
	Measurement: linear		29		
	Money values		63		14

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
GEOMETRY	Pupils should have experiences in recognizing a circle, a triangle, a square, and a rectangle.	MATHEMATICAL UNDERSTANDINGS				
		Recognition of familiar figures		54		

NUMBER SYSTEMS AND NUMERATION SYSTEMS

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
Pupils should have: - an understanding of place value - an understanding of grouping by tens - the ability to count by ones to 100 - an understanding of the "one more" concept as it relates to the decimal system of numeration	MATHEMATICAL UNDERSTANDINGS				
	The meaning of whole numbers 0		3		
	100	241			
	101-999	244, 246	45, 46, 73, 74, 75, 97		
	Expanded notation to rename numbers through 999	248			
	Place value in ten's and hundred's place	241			
	The meaning of fractional numbers				104, 131
= = = = = = = = = = = = =					
Pupils should have: - an understanding of the repeated use of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 in writing the numerals to 99 - the ability to write the numerals 0-9	MATHEMATICAL SKILLS				
	Counts by ones, twos, fives, tens, hundreds		46, 128		55
	Reads and writes numerals through 999	242, 246	45, 75		55, 56, 86, 87, 98

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
FUNDAMENTAL OPERATIONS Pupils should have: - a knowledge of the basic addition and subtraction facts - the ability to rename numbers in many ways - an understanding of place value	COMPUTATIONAL SKILLS				
	Addition with regrouping (carrying) from one's to ten's place	181, 183, 186, 187, 195, 259, 273, 305		182, 184, 185, 188, 196-200, 205, 206, 260-263	
	Subtraction with regrouping (borrowing) from ten's to one's place	189, 191, 207, 265		190, 192, 193, 194, 208-211, 213, 214, 266-268	
	Addition with regrouping (carrying) from ten's to hundred's place	273, 307,	80	274-279, 308, 309, 311	81
	Subtraction with regrouping (borrowing) from hundreds to ten's place	281, 313, 315	82	282-286, 314, 316, 317, 318	83
	Addition with three or more addends, two and three digit numerals	201		202, 203, 204, 253, 254, 264, 310, 312	
Pupils should have: - an understanding of the meaning of addition and subtraction	MATHEMATICAL UNDERSTANDINGS				
	Addition and subtraction are inverse operations			212	93, 103
	Addition is commutative				7, 8, 9, 21, 37, 105
	Addition is associative				50, 51, 77, 101, 111

FUNDAMENTAL OPERATIONS	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
	Pupils should have experiences with - recognition of equivalent sets - counting by twos, fives, and tens - using a number line - the addition of several like addends such as 3+3 = 6, 5+5+5 = 15 - subtraction	COMPUTATIONAL SKILLS				
		* Basic multiplication facts through 5 x 5	325, 326, 327, 329, 331, 333, 337, 338, 341, 342, 353, 355	113, 114 132	328, 330, 332, 334, 335, 336, 339, 340, 343, 344, 349, 350, 351, 352, 354, 356	
		* Basic division facts whose dividends are 25 or less	357, 359	115, 133	358, 360, 362, 363, 364	
		MATHEMATICAL UNDERSTANDINGS				
		* Multiplication is commutative	347		348, 366	
		* Multiplication and division are inverse operations	357	116, 133, 142	361, 365, 366	
		* Multiplication is repeated addition	331, 342		332, 346	
		* Division is repeated subtraction	359			
		* Function of one as a factor in multiplication	345		346	
		* Function of one as a divisor in division	361			

* OPTIONAL TOPICS FOR THIS GRADE

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
MEASUREMENT	Pupils should have classroom experiences involving measurement.	MATHEMATICAL UNDERSTANDINGS				
		Measurement: quantity		94		
		Measurement: time				96
		Measurement: linear			297, 299	
		Measurement: calendar				135
		Measurement: temperature		129		
		Money values			221-240	85, 95,112
GEOMETRY	Pupils should be familiar with the geometric terms - rectangle, square, triangle, circle.	MATHEMATICAL UNDERSTANDINGS				
		Recognition of familiar shapes				84, 130

NUMBER SYSTEMS AND NUMERATION SYSTEMS

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension		
		BASIC	SUPPL.#1	BASIC	SUPPL.#1	SUPPL.#2
Pupils should have experiences with: - using ones, tens and hundreds to describe the value of a number - counting with emphasis on the repetitive patterns of the numbers - recognizing that a fraction represents a part of something - concrete materials (place-value chart) to develop the meaning of each number	MATHEMATICAL UNDERSTANDINGS					
	The meaning of whole numbers 0-999			41, 79	4, 5, 6, 7, 36, 37, 86, 87, 129-132	
	Place value in ten's and hundred's place			40, 78	4, 5, 85, 86, 87	
	Expanded notation to rename numbers 11-999			41, 42, 80, 81		
	A number has many names					1-3, 39 121
	The meaning of fractional numbers				51, 52, 105-111	123-125
	* The meaning of Roman Numerals I-XII		134			
Pupils should have experiences with: - writing the numerals 0-9 - writing the numerals 0-100 in sequential order - counting by ones in partial sequences	MATHEMATICAL SKILLS					
	Reads and writes numerals through 999		129		2, 6, 7, 38, 133	51, 128
	* Reads and writes Roman numerals through XII		135			

* OPTIONAL TOPICS FOR THIS GRADE

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension		
		BASIC	SUPPL.#1	BASIC	SUPPL.#1	SUPPL.#2
FUNDAMENTAL OPERATIONS Pupils should have experiences with - renaming numbers using expanded notation - adding and subtracting numbers without regrouping (carrying)	COMPUTATIONAL SKILLS					
	Mastery of basic addition facts			1, 2, 11, 18, 19, 20, 21, 24, 25, 30, 31, 32	8, 9, 10, 11, 12, 14, 27, 34, 39, 40, 47, 48	5, 6, 11, 12, 13, 16, 28, 42, 43, 53
	Mastery of basic subtraction facts			5, 6, 18, 30, 31	15, 16-21, 34, 39, 40, 47, 48	16
	Addition without regrouping or carrying			13, 43, 44, 82, 83	30-32, 42-45, 59, 60, 63, 74	
	Addition with regrouping (carrying)			53, 54, 55, 56, 88, 89, 90, 91, 92, 93, 102, 103	89-97, 112, 121, 124	70, 71
	Subtraction without regrouping (borrowing)			16, 45, 84, 85	30-32, 42-45, 74, 123	
	Subtraction with regrouping (borrowing)		142-146	57, 58, 59, 94, 95, 96, 97, 98, 107, 108, 109	147-151	72, 73

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension		
			BASIC	SUPPL. #1	BASIC	SUPPL.#1	SUPPL.#2
FUNDAMENTAL OPERATIONS	Pupils should have: - an understanding of the meaning of addition and subtraction - experiences in reading and writing mathematical sentences	MATHEMATICAL UNDERSTANDINGS					
		Function of zero as an addend in addition					
		Function of zero as an addend in subtraction					
		An application of the commutative and associative principles of addition can simplify addition			1, 9, 10	28, 61, 62	70
		Addition and subtraction are inverse operations			3, 4, 22, 23	22, 23, 24, 47, 67, 68, 152-153	13, 16

FUNDAMENTAL OPERATIONS

Prerequisites	Skills and Understandings	Introduction			Review and/or Extension		
		BASIC	SUPPL.#1	SUPPL.#2	BASIC	SUPPL #1	SUPPL#2
Pupils should have experiences with: - recognition of equivalent sets - counting by twos, fives, and tens - using a number line - the addition of several like addends such as 6+6 = 12 and 3+3+3+3 = 12 - subtraction	COMPUTATIONAL SKILLS						
	Basic multiplication facts through 5x5	121,122, 123,125, 127,129	171-173	20, 21, 22, 23	124,126, 128,130, 131,132	182	29, 31
	* Basic multiplication facts beyond 5x5 and through 9x9	139-148, 153-160, 165,174, 176,178, 180	202-203		149,150 161,162 163,164 166,167 168,169 175,177 179,181 182,183		25, 32, 37, 46 52
	Basic division facts whose dividends are twenty-five or less and are products of basic multiplication facts	134,135	176-179, 208		136,138		
	* Basic division facts whose dividends are eighty one or less and are products of basic multiplication facts	170-171 173,185	199-200, 202-203, 209		186,187		33,34, 37
= = = = = = = = = = =							
Pupils should have: - an understanding of the meaning of multiplication and division - experiences with mathematical sentences	MATHEMATICAL UNDERSTANDINGS						
	Multiplication is commutative.	131	173				
	*Multiplication is distributive	138-143 145,147 153-155 157,159 174,176 178,180	202-203				
	Function of zero as a factor in multiplication	132, 149			149		
*OPTIONAL TOPICS FOR THIS GRADE	Function of one as a factor in multiplication	132, 149 161-162	174		149		

Prerequisites	Skills and Understandings	Introduction			Review and/or Extension		
		BASIC	SUPPL.#1	SUPP#2	BASIC	SUPPL.#1	SUPPL.#2
	MATHEMATICAL UNDERSTANDINGS (Cont.)						
	Multiplication and division as inverse operations	134	176-178 181				
	Division as repeated subtraction	135					
MEASUREMENT Pupils should have experiences with arbitrary units of measurement before working with standard units of measurement.	MATHEMATICAL UNDERSTANDINGS						
	Measurement: time					54-55	
	Measurement: calendar					56	
	Measurement: linear	74, 76, 77	105-108			103-104	
	Measurement: liquid	34					
	Measurement: weight						
	Money values					77, 78	
Pupils should be familiar with the four fundamental operations. Pupils should be familiar with the standard units used in measurement.	COMPUTATIONAL SKILLS						
	Measurement: liquid	35, 36			37-39		
	Measurement: linear	68-73, 75					
	Money values		79-82, 125, 126				
	Measurement: time		137				

	Prerequisites	Skills and Understandings	Introduction			Review and/or Extension		
			BASIC	SUPPL.#1	SUPPL.#2	BASIC	SUPPL.#1	SUPPL.#2
GEOMETRY	Pupils should be aware of geometric figures, such as circle, triangle, square, rectangle.	MATHEMATICAL UNDERSTANDINGS						
		Recognition and description of familiar figures		189-196				

NUMBER SYSTEMS AND NUMERATION SYSTEMS

Prerequisites	Skills and Understandings	Introduction			Review and/or Extension		
		BASIC	SUPPL.#1	SUPPL.#2	BASIC	SUPPL.#1	SUPPL.#2
Pupils should have - experiences with place value through hundred's place - experiences in counting to see the sequential order of the number names - experiences in renaming numbers using expanded notation - experiences in finding parts of a whole or of a set	MATHEMATICAL UNDERSTANDINGS						
	The meaning of whole numbers through 9999	287, 288	216				1-3, 50, 116, 128
	* 10,000 - 999999	298	217				
	* 1,000,000	302					
	Place value in the ten's and hundred's place						
	Place value in the thousand's place	287-288,295, 298	130-132, 216,217				
	* Place value in the million's place	302					
	Expanded notation to rename numerals through 9999	288, 289				271	
	Fractional numbers as parts of a whole		166-167, 250		193-198, 201		35, 87-91, 101, 123,124, 125
	Fractional numbers as parts of a set		109-111, 168, 186-187, 251		202		100, 102
Pupils should be able to read and write the numerals through 999. Pupils should recognize the sequential order of the numerals.	MATHEMATICAL SKILLS						
	Reads and writes numerals through 9999		133				39, 128
	* 10,000 - 999999	298, 299	218, 296				
	* 1,000,000	302, 303					
* OPTIONAL TOPICS FOR THIS GRADE							

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension		
		BASIC	SUPPL.#1	BASIC	SUPPL. #1	SUPPL.#2
	MATHEMATICAL SKILLS					
	Reads and writes fractional numerals through eighths	193-198	163-165			
	Reads and writes numerals to show money value					
Pupils should have: - a knowledge of the basic addition and subtraction facts - a knowledge of place value - the ability to rename numbers	COMPUTATIONAL SKILLS					
	Addition algorism with and without regrouping (carrying)			203-208,219-222, 290, 300, 304	121, 124, 160, 205, 247	6,28,42, 43,53,70, 71, 120
	Subtraction algorism with and without regrouping (borrowing)			209-213, 219-222, 291, 301, 305	123, 149-155, 206, 248	72, 73, 120
	* Addition of fractional numbers with like denominators with sums of one or less	199-200				96, 99
Pupils should have an understanding of the meaning of addition and subtraction.	MATHEMATICAL UNDERSTANDINGS					
	Addition is commutative					
	Addition is associative					55
	Subtraction is neither, commutative or associative					
	Regrouping (carrying and borrowing) is a way of renaming numbers in a more convenient way for addition or subtraction					
	Function of zero as an addend in addition and subtraction					
	Addition and subtraction are inverse operations				159	12,13,16

FUNDAMENTAL OPERATIONS

* OPTIONAL TOPICS FOR THIS GRADE

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension		
		BASIC	SUPPL. #1	BASIC	SUPPL. #1	SUPPL.#2
FUNDAMENTAL OPERATIONS Pupils should have: - experiences with counting to 100 by twos, threes, fours, and fives - experiences with 10 as a factor in multiplication - subtraction - an understanding of place value	COMPUTATIONAL SKILLS					
	Basic multiplication facts through 9x9					8,9,10,21, 22,23,25, 26,29,48-50,52
	Basic division facts whose dividends are 81 or less and are products of basic facts					31-34
	Multiplication algorism without regrouping	240-243, 248	210, 227	306,307, 308,318	228	
	Multiplication algorism with regrouping	244, 250	212-213, 229-231	245,246, 251,252-253,261, 309-317, 319-320	275	46-47, 66, 67
	Division algorism, no remainders	254,321, 324,326	238-243	255-259, 260,322, 323,325, 327	276,277	68, 69
Pupils should have an understanding of the meaning of multiplication and division.	MATHEMATICAL UNDERSTANDINGS					
	Multiplication is commutative					18
	Multiplication is associative	248		247		57
	Multiplication is distributive		202-203			61
	Multiplication and division are inverse operations				199, 200, 246	40
	Function of one as a factor in multiplication and division					
	Function of zero as a factor in multiplication					

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension		
			BASIC	SUPPL.#1	BASIC	SUPPL.#1	SUPPL.#2
GEOMETRY	Pupils should be familiar with the circle, triangle, square, and rectangle. Pupils should be able to recognize the likenesses and differences of similar figures.	MATHEMATICAL UNDERSTANDINGS					
		Recognition and properties of familiar forms		189-196, 254-257			
MEASUREMENT	Pupils should have experiences with arbitrary units of measurement before being introduced to the standard units of measurement.	MATHEMATICAL UNDERSTANDINGS					
		Measurement: linear		224, 264-265			
		Measurement: liquid				220	
		Measurement: temperature		222-223			
		Measurement: time			225-230, 236, 237		
		Measurement: calendar			223-224		
		Money values			264-265, 268, 270		
	Pupils should be familiar with the four fundamental operations. Pupils should be familiar with the standard units used in measurement.	COMPUTATIONAL SKILLS					
		Measurement: time	231-233, 238		231-233, 239		86, 87
		Measurement: linear					
		Measurement: liquid				221	
		Money values		232, 244	266-267, 269, 271-286	125, 126	74-76, 82, 83

Prerequisities	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
NUMBER SYSTEMS AND NUMERATION SYSTEMS Pupils should have: - an understanding of place value through thousand's place - experiences in counting and reading larger numbers - experiences in grouping sets of ten - experiences in finding parts of a whole and parts of a set - experiences with the number line	MATHEMATICAL UNDERSTANDINGS				
	The meaning of whole numbers through 1,000,000			11, 12, 34, 78, 79, 81	
	Place value in ten's, hundred's, thousand's and million's place			12, 78, 80, 81	
	Expanded notation to rename numbers through 10,000			35, 79, 80, 81	
	The meaning of fractional numbers including equivalent fractions			86-92	37, 40, 41, 42, 43, 44, 46, 47, 54, 55
	The decimal system of numeration is built upon a grouping factor of 10 and has a repetitive order to the numerals in each place value				
==========					
Pupils should be able to read and write numerals through 1000.	MATHEMATICAL SKILLS				
	Reads and writes whole numbers through 10,000			11, 12, 13	
	Reads and writes fractional numbers			86-92	
	Reads and writes numerals to express money values			18	
	Reads and writes Roman numerals through C	26-28			

FUNDAMENTAL OPERATIONS

Prerequisities	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
Pupils should know: - the basic addition and subtraction facts - pupils should be familiar with renaming numbers using place value	COMPUTATIONAL SKILLS				
	Addition algorism without regrouping (carrying)			14, 15	1, 2, 15
	Addition algorism with re-grouping (carrying)			36-39, 53	3, 4, 5
	Subtraction algorism without regrouping (borrowing)			14, 15	
	Subtraction algorism with regrouping (borrowing)			36-39	18
Pupils should be familiar with the meaning of addition and subtraction.	MATHEMATICAL UNDERSTANDINGS				
	Addition is commutative			2, 5	
	Addition is associative			23, 24, 52	
	Addition and subtraction are inverse operations			2, 3, 4, 5, 44	
	Zero is the identity element for addition and subtraction				
	COMPUTATIONAL SKILLS				
Pupils should be familiar with: - basic multiplication and division facts - renaming numbers using place value - reading and writing numerals using dollar-and-cents notation - multiplication involving multiples of 10 and 100 as a factor - subtractive division	Mastery of basic multiplication facts through 9x9			58-66, 93, 97,98,101, 102, 105, 110,113,122	6, 7, 10 11, 12, 28, 39
	Mastery of basic division facts			58-66, 93, 97,98,101, 102, 110, 113	
	Multiplication algorism with a one-digit multiplier without regrouping (carrying)			70, 71, 72, 94, 123, 124, 150, 154	

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
FUNDAMENTAL OPERATIONS	COMPUTATIONAL SKILLS (Cont.)				
	Multiplication algorism with a one-digit multiplier with regrouping (carrying)			73, 93,103, 107, 111, 125, 126, 151-152	
	Multiplication algorism involving dollars and cents			96, 100, 101, 124-126, 152, 153	
	Division algorism in which the divisor is a one-digit numeral, no remainders	75		94, 99, 103, 107, 111	
	Division algorism, one-digit divisors with remainders	131-134		135, 136, 155-163	
	Division algorism involving dollars and cents	164-165		166-167	
Pupils should have: - an understanding of the meaning of multiplication and division - experiences in reading and writing mathematical sentences	MATHEMATICAL UNDERSTANDINGS				
	Multiplication is commutative			58, 59, 66,	
	Multiplication is associative				
	Function of zero in multiplication	153			
	One is the identity element in multiplication			62	
	One is the identity element in division			62	

Prerequisities		Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
FUND. OPER.		MATHEMATICAL UNDERSTANDINGS (Cont.)				
		Multiplication and division are inverse operations			59, 60, 61, 66, 98,105, 168	
		Multiplication is distributive			95, 106, 103, 110	21, 22, 23, 24, 25, 28
GEOMETRY	Pupils should be able to identify geometric figures such as a circle, square, rectangle, and a triangle.	MATHEMATICAL UNDERSTANDINGS				
		Recognition and indentification of common geometric shapes				
MEASUREMENT	Pupils should have experiences with arbitrary units of measurement prior to the introduction of the standard units of measurement.	MATHEMATICAL UNDERSTANDINGS				
		Money values			17, 55, 56	
		Measurement: linear			30, 117-119	
		Measurement: weight			32, 33, 146	
		Measurement: temperature	142-143			
		Measurement: liquid	144-145			
	= = = = = = = = = = = = = =					
	Pupils should be familiar with: - the four fundamental operations - the standard units used in measurement	COMPUTATIONAL SKILLS				
		Measurement: linear			31, 120	
		Money values			19, 20, 42-43, 77, 164-167	
		Measurement: weight			121	

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
NUMBER SYSTEMS AND NUMERATION SYSTEMS	Pupils should have: - an understanding of place value through million's place - experience with the number line - experiences which involve counting using larger numbers - an understanding of the repetitive use of the numbers in a sequence	MATHEMATICAL UNDERSTANDINGS				
		The meaning of whole numbers through 100,000,000			262, 263, 264-265, 267	
		Place value through one hundred million's place			264-265	
		The meaning of fractional numbers			232, 233, 234	46
		Fractional numbers have many names (equivalent fractions)	236-239		235, 236, 237, 245	41, 42, 43, 44, 45, 65
	Pupils should be able to read and write numerals through 999,999.	MATHEMATICAL SKILLS				
		Reads and writes numerals through 999,999,999			262,263,264-265,266,	
		Reads and writes fractional numerals			232-233,235, 236-239	
FUNDAMENTAL OPERATIONS	Pupils should be familiar with: - the basic addition and subtraction facts - the renaming of numbers using place-value notation	COMPUTATIONAL SKILLS				
		Addition algorism, with and without regrouping (carrying)			179, 256	4, 36, 80
		Subtraction algorism with and without regrouping (borrowing)			179, 256	
		Addition of fractional numbers with like denominators, sums two or less			240-241, 242, 243	64, 81
		Subtraction of fractional numbers with like denominators			244, 246, 249	64
	Pupils should understand the meaning of addition and subtraction.	MATHEMATICAL UNDERSTANDINGS				
		Addition of whole numbers and fractional numbers is commutative				

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
Pupils should have experiences in reading and writing mathematical sentences.	MATHEMATICAL UNDERSTANDINGS (Cont.)				
	Addition of whole numbers is associative				
	Addition and subtraction are inverse operations for whole numbers and fractional numbers	247, 248			
	Zero is the identity element for addition and subtraction				
Pupils should know the basic multiplication and division facts.	COMPUTATIONAL SKILLS				
	Multiplication algorism, one-digit multipliers with and without regrouping (carrying)			181, 203, 204	
Pupils should be familiar with multiplication in which one factor is a multiple of 10 or 100.	Division algorism, one-digit divisors			181, 205, 206	82, 83,84, 85, 92,94, 98
	Multiplication algorism, two-digit multipliers with and without regrouping (carrying)	207, 208, 209, 210, 211	29, 30, 31	212, 213, 215, 216-217, 257	
	Division algorism, two-digit divisors	221-224, 226,227		225, 227, 228, 257	91, 93
Pupils should be familiar with the meaning of multiplication and division.	MATHEMATICAL UNDERSTANDINGS				
	Multiplication is commutative, associative, and distributive			215	
Pupils should have experiences in reading and writing mathematical sentences.	Function of zero in multiplication				
	One is the identity element for multiplication and division				
	Multiplication and division are inverse operations				

FUNDAMENTAL OPERATIONS

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
GEOMETRY	Pupils should be able to describe geometric figures and shapes that are found in the every-day world.	MATHEMATICAL UNDERSTANDINGS				
		The meaning of points, lines, and line segments	184-187			
		The meaning of rays and angles	188-189			
		Recognition of familiar geometric shapes and forms	190-194			
		Recognition of solid figures	195			
MEASUREMENT	Pupils should be familiar with the standard units used in measurement.	MATHEMATICAL UNDERSTANDINGS				
		Measurement: time			173, 174, 268-269	
		Measurement: calendar			175-176	
		Measurement: weight	178			
		Measurement: linear	252-255			
	Pupils should have: - an understanding of the operations needed for computation - an understanding of the standard units used in measurement	COMPUTATIONAL SKILLS				
		Money values			183,214,229, 258-259	
		Measurement: time			268-269	
		Measurement: temperature			276	
		Measurement: linear			277	

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
NUMBER SYSTEMS AND NUMERATION SYSTEMS	Pupils should have: - experiences in renaming numbers using place-value notation - an understanding of place value through millions - experiences with the number line - an understanding of the meaning of fractional numbers	MATHEMATICAL UNDERSTANDINGS				
		The meaning of whole numbers through millions			1-7, 131	
		Place value through hundred million's place			1, 3, 4-7, 131, 132-133	
		The meaning of fractional numbers	103, 104		96, 97	
		Fractional numbers have many names (equivalent fractions)			98, 99-102	
		The meaning of the decimal system of numeration (grouping principle)			5-6, 132-133	
		The meaning of positional and non-positional numeration systems	9-10			
	Pupils should: - be able to read and write numbers through 999,999 - be familiar with numbers that are multiples of 10, 100, and 1000	MATHEMATICAL SKILLS				
		Reads and writes numerals through 999,999,999 using period groupings			1, 2, 3-7, 131	
		Rounds numbers "up" and "down"	134-135			
		Reads and writes fractions			96, 97, 105	
FUND. OPER.	Pupils should: - know all the basic addition and subtraction facts - be familiar with the use of regrouping in addition and subtraction	COMPUTATIONAL SKILLS				
		Mastery of the addition algorism for whole numbers without using "crutches"			12-19	8, 12
		Renaming of addends to simplify addition				

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
FUNDAMENTAL OPERATIONS	Pupils should: - be familiar with renaming numbers using place-value notation - have experiences in identifying fractional numbers on a number line - know that a fractional number can be renamed in many ways = = = = = = = = = = = = = = = Pupils should understand that the operations of addition and subtraction are alike for all numbers. Pupils should be familiar with mathematical sentences and equations.	COMPUTATIONAL SKILLS (Cont.)				
		Mastery of the subtraction algorism for whole numbers without using "crutches"			22-25, 27-30	
		Addition of fractional numbers with like denominators	111, 113		106-109,114, 115, 116	
		Subtraction of fractional numbers with like denominators	122-123, 125-127		117-120,124, 128,129,130	
		MATHEMATICAL UNDERSTANDINGS				
		Addition with whole numbers or fractional numbers is commutative and associative			12, 13, 35, 110, 112	
		Addition and subtraction are inverse operations			23, 24, 35, 118, 119	
		Subtraction is not commutative or associative			35	
		Zero is the identity element for addition and subtraction				
	Pupils should know: - the basic facts of multiplication and division - how to multiply with a one-digit multiplier - how to divide by a one-digit divisor	COMPUTATIONAL SKILLS				
		Multiplication algorism, two-digit multipliers with and without regrouping (carrying)			45-49	37, 43, 44, 45
		Division algorism, one-digit divisors			51-63	46, 47
		Division algorism, two-digit divisors			68-75, 81-85, 91, 92, 93, 94, 95, 138	52, 53

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
FUNDAMENTAL OPERATIONS		COMPUTATIONAL SKILLS (Cont.)				
		Estimating quotients by comparing numbers	52-57, 66, 71, 76, 79, 89		77, 80, 90, 136, 137, 138	
	Pupils should: - understand the meaning of multiplication and division - be familiar with the terms commutative, associative, and distributive - be familiar with reading and writing mathematical sentences	MATHEMATICAL UNDERSTANDINGS				
		Multiplication is commutative, associative, and distributive			37, 38, 40, 41	9, 42
		Multiplication and division are inverse operations			50, 51	
		One is the identity element for multiplication and division			39, 51	
		Function of zero in multiplication			40	
		Division is distributive in certain instances				
MEASUREMENT	Pupils should: - be familiar with the standard units of measurement - have an understanding of the operations needed for computation	COMPUTATIONAL SKILLS				
		Measurement: time				28,29,33,54
		Measurement: calendar				32
		Measurement: linear				32
		Measurement: liquid				32
		Measurement: weight				33, 50
		Measurement: quantity				54
		Money values			8, 20, 31, 44, 64, 78, 86	26, 27, 30, 32, 33, 54

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
NUMBER SYSTEMS AND NUMERATION SYSTEMS	Pupils should be familiar with the meaning of the base ten system of numeration, including the renaming of numbers using place-value notation and the use of ten as a factor for grouping.	MATHEMATICAL UNDERSTANDINGS				
		The meaning of the system of whole numbers			190, 283, 298, 311, 312	
		The meaning of fractional numbers	193-195		178-181, 189, 196	
		The meaning of the decimal system of numeration	236-241		246	72, 73
		* The meaning of the base five system of numeration	261-269			
		The meaning of decimals as fractional numbers	243		250, 255, 308	
		Place value extended to tenths, hundredths and thousandths	237, 238, 240			
	Pupils should be aware of the existence of the various numbers and number systems and their names.	MATHEMATICAL SKILLS				
		Classifies numbers as whole, fractional, decimal, odd, even, prime, composite				
		Reads and writes numerals grouped in periods			190, 205, 283, 298	
		Reads and writes decimals through thousandths	236-241, 242		244-246, 308	
		Expresses ratios as fractions	270-276		277	
		* Reads and writes numerals in base five notation	263-269			

* OPTIONAL TOPICS FOR THIS GRADE

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
FUNDAMENTAL OPERATIONS	Pupils should have: - complete mastery of the basic addition and subtraction facts - an understanding of place-value - facility in addition and subtraction involving regrouping	COMPUTATIONAL SKILLS				
		Mastery of the addition algorism with whole numbers without using "crutches"			152, 284, 285, 313	6, 7, 8
		Mastery of the subtraction algorism with whole numbers without using "crutches"			153, 286, 313	7
		Addition of fractions with unlike denominators	182, 183	17, 54-55, 59	184, 187, 188, 197, 302,303,304	
		Subtraction of fractions with unlike denominators	182, 183, 185	17, 54-55, 59	184,186,187, 188,198,302, 303,304	
		Addition of decimal fractions without regrouping (carrying)	250-251	68		
		Subtraction of decimal fractions without regrouping (borrowing)	252	68		
		Addition of decimal fractions with regrouping (carrying)	248-249, 253		255, 310	
		Subtraction of decimal fractions with regrouping (borrowing)	254	71	255, 310	
		MATHEMATICAL UNDERSTANDINGS				
		Addition of whole numbers, fractional numbers, and decimal fractions is commutative and associative				
		Addition and subtraction are inverse operations				

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
FUNDAMENTAL OPERATIONS	Pupils should be familiar with: - multiplication by one-digit multipliers - division by one-digit divisors	COMPUTATIONAL SKILLS				
		Multiplication algorism, two-digit multipliers			170, 288	37, 43, 44, 45
		Multiplication algorism, three-digit multipliers				53
		Estimates products and dividends			292, 293, 321, 322,	76-79
		Division algorism, two-digit divisors			171,191,291, 292,293,294	52, 53
		Division algorism, remainders expressed as fractional numbers	234-235	75, 76		
		MATHEMATICAL UNDERSTANDINGS				
		Multiplication is commutative, associative, and distributive				
		Division is not commutative or associative				
		Division may be distributive				
		Multiplication and division are inverse operations				
		One is the identity element for multiplication and division				
GEOMETRY	Pupils should be able to describe familiar geometric shapes and figures, using formal geometric terms.	MATHEMATICAL UNDERSTANDINGS				
		The meaning of point, line, and line segment			213-215	

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
GEOMETRY		MATHEMATICAL UNDERSTANDINGS (Cont.)				
		The meaning of plane	216-217			
		The meaning of rays and angles			218	100,102,103
		The meaning of closed plane figures			219-221, 223-224	100,101,125, 126
		The meaning of solid geometric forms			222, 226	
MEASUREMENT	Pupils should: - be familiar with the standard units of measurement - have an understanding of the operations needed for computation	COMPUTATIONAL SKILLS				
		Measurement: time	162, 164-166			28, 29, 54, 66
		Measurement: linear	154-155		256,257,258, 259	32, 63, 87, 88, 89
		Measurement: liquid	160			32, 67
		Measurement: weight	167			33
		Measurement: area	175		176	78
		MATHEMATICAL UNDERSTANDINGS				
		Measurement: time			161	
		Measurement: calendar			163	
		Measurement: linear	142-150			
		Measurement: liquid			156-158	
		Measurement: temperature			168-169	
		Measurement: area	172-174	86		88

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
NUMBER SYSTEMS AND NUMERATION SYSTEMS	Pupils should be familiar with the meaning of the base ten system of numeration, including the renaming of numbers using place-value notation and the use of ten as a factor for grouping.	MATHEMATICAL UNDERSTANDINGS				
		The meaning of whole numbers through billions			4, 5, 6, 7	2-8
		Exponential notation for whole numbers	6, 7	58, 59, 60, 61	8	
		Place value through billions			4, 5	
		The meaning of decimal fractions	148-152, 155			12
		Place value through hundred thousandths	149-154			
		The meaning of fractional numbers			40, 41, 42, 43, 44, 45, 46, 47, 57, 58	12, 27, 28, 36, 38
		The meaning of the base six system of numeration	9, 10, 11, 12		13	
		The meaning of the Roman system of numeration			14	
		The meaning of reciprocal	88-89		90-95	
	Pupils should have experiences in reading and writing: - numerals through millions - dollars and cents - decimal fractions - fractions	MATHEMATICAL SKILLS				
		Reads and writes numerals through billions			2, 3, 5, 63, 101	2-8
		Reads and writes numerals in base six notation			9-12	
		Uses decimals to rename fractions	148-158		157, 165	12

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
	MATHEMATICAL SKILLS (Cont.)				
	Uses exponents to rename numbers	6, 7,	58, 59, 60, 61	8, 63, 101	
	Rounds decimal fractions to place value	162-163		164	
	Renames ratios as a fraction	124, 125, 126		127, 128	
Pupils should be familiar with: - the renaming of numbers using place-value notation - the operations of addition and subtraction - the renaming of fractional numbers in many ways - the renaming of decimal fractions in many ways - regrouping or renaming as used in addition and subtraction	COMPUTATIONAL SKILLS				
	Addition as an operation with an ordered pair of numbers	15		16, 17, 18, 64	22, 39
	Subtraction as an operation with an ordered pair of numbers	15, 19		18, 20, 64	
	Addition of fractions with like denominators			48, 49, 50, 51	
	Addition of fractions with unlike denominators			59, 60, 61, 67, 69	
	Subtraction of fractions with like denominators			54	
	Subtraction of fractions with unlike denominators			59, 60, 61, 68, 69	
	Addition of decimal fractions	158		159, 160, 161	
	Subtraction of decimal fractions				

FUNDAMENTAL OPERATIONS

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
	MATHEMATICAL UNDERSTANDINGS (Cont.)				
	Addition and subtraction are inverse operations			15, 19	22
	Addition with all numbers is commutative	49			40
	Addition with all numbers is associative	49		17	39, 40, 41
	Subtraction is not commutative or associative				
Pupils should be familiar with: - subtractive division - mental computations involving multiplication in which one factor is a multiple of 10 or 100 - renaming fractions	COMPUTATIONAL SKILLS				
	Multiplication algorism with whole numbers without the use of crutches	29		24, 25, 26, 27, 28, 65	16, 50, 51
	Division algorism with two-digit divisors, whole numbers	113		30, 31, 32-37, 65	17
	Multiplication of fractional numbers by fractional numbers	72, 73, 74		75, 77, 83 83	23, 24, 25, 35
	Multiplication of fractional numbers and whole numbers	76			
	Multiplication of mixed fractional numbers	79		80, 81, 82, 83, 84, 166	26
	Division of a whole number by a fractional number	86, 87		92	32, 35

FUNDAMENTAL OPERATIONS

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
	COMPUTATIONAL SKILLS (Cont.)				
	Division of fractional numbers using reciprocals	88, 89		90, 91, 93	32
	Division of fractional number by a fractional number	88, 89, 103-105		90-95, 98, 166	32, 35
Pupils should have: - an understanding of the meaning of multiplication and division - experiences in reading and writing mathematical sentences	MATHEMATICAL UNDERSTANDINGS				
	Multiplication of all numbers is associative, distributive, and commutative			22, 23, 65	18, 19, 43, 44, 45, 46
	The product of any number and its reciprocal is always one	88, 89		94,	34, 35
	One is the identity element for multiplication and division of all numbers			65	
	Multiplication and division are inverse operations			22, 65	18, 19
	Division may be expressed as a fraction	53			
	Division may be distributive			65	

FUNDAMENTAL OPERATIONS

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
Pupils should have: - an understanding of the operations needed for computation - an understanding of the standard units of measurement	COMPUTATIONAL SKILLS				
	Measurement: time			130, 131, 134	
	Measurement: calendar			132	
	Measurement: linear			131, 132, 133, 135, 136, 166	62, 63, 64, 65, 66, 67
	Measurement: liquid			129, 130, 132, 133, 166	
	Measurement: weight			123, 130, 131, 132, 133, 166	
Pupils should have experiences involving the use of standard units of measurement.	MATHEMATICAL UNDERSTANDINGS				
	The meaning of standard units of measurement			116-117	
	The meaning of error of measurement	118-122			

NUMBER SYSTEMS AND NUMERATION SYSTEMS

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
Pupils should be familiar with the meaning of the base ten system of numeration, including the renaming of numbers using place-value notation and the use of ten as a factor for grouping.	MATHEMATICAL UNDERSTANDINGS				
	The meaning of whole numbers through billions			178, 194, 211	2-4, 6
	The meaning of fractional numbers			179	38
	The meaning of decimal fractional numbers			178	5, 7
	The meaning of the positive and negative integers	262-265			
	The meaning of per cent	239-241		242, 243, 244	103
Pupils should have experiences with - reading and writing numerals through millions - renaming various kinds of numbers in many different ways	MATHEMATICAL SKILLS				
	Reads and writes numerals through billions			178, 194, 197, 198, 202,203,204	56, 57, 61
	Renames fractional numbers as per cents	246		240-241, 245, 247	
	Reads and writes numerals written as positive and negative integers	262-265			
	Renames fractions as decimals	190		193, 297	12, 102

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
Pupils should be familiar with the operations of addition and subtraction of whole numbers, fractional numbers, and decimal fractions.	COMPUTATIONAL SKILLS				
	Addition with positive and negative integers	266, 267	114	268, 269	115, 121
	* Addition and subtraction with base six numerals	311-312			
	Addition algorism, whole numbers			283	
	Subtraction algorism, whole numbers			283	
	Addition of fractional numbers			285, 286	
	Subtraction of fractional numbers			285, 286	
	Addition of decimal fractional numbers			298, 301	15
	Subtraction of decimal fractional numbers			298	
	MATHEMATICAL UNDERSTANDINGS				
	Addition of all numbers is commutative and associative				22, 23, 45, 109, 110
	Addition and subtraction are inverse operations				22, 23
	COMPUTATIONAL SKILLS				
	Multiplication algorism, whole numbers			259, 284	106, 107

* OPTIONAL TOPICS FOR THIS GRADE

Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
		BASIC	SUPPL.	BASIC	SUPPL.
Pupils should be familiar with the operations of multiplication and division of whole numbers and fractional numbers. Pupils should be familiar with renaming fractions as decimals.	COMPUTATIONAL SKILLS (Cont.)				
	Division algorism, whole numbers			191, 208, 260, 284	17
	Multiplication of a whole number by a decimal fraction	170-171		174, 175, 177, 180	
	Multiplication of a decimal fraction by a decimal fraction	172-173, 176		174, 175, 185, 299	16
	Division algorism, decimal fractions	182-183		184, 186, 187, 192,300	
	Multiplication of fractional numbers			287, 290	24, 35, 118
	Division of fractional numbers			288, 290	24, 35
	MATHEMATICAL UNDERSTANDINGS				
	Multiplication of all numbers is commutative, associative, and distributive			259, 320	18, 19, 20, 43, 44, 45, 46, 47, 112
	Multiplication and division are inverse operations				24, 25, 26
	One is the identity element for multiplication and division				
	Division is not commutative or associative				
	Division may be expressed as a fraction				

FUNDAMENTAL OPERATIONS

	Prerequisites	Skills and Understandings	Introduction		Review and/or Extension	
			BASIC	SUPPL.	BASIC	SUPPL.
GEOMETRY	Pupils should be familiar with points, lines, and planes as they are used in geometry.	MATHEMATICAL UNDERSTANDING				
		The meanings of points, lines, line segments, and rays			212-214, 304	
		The meaning of angle			215	
		The meaning of parallel and perpendicular lines	220, 221, 222			
		The meaning of planes			216, 235	
		The meaning and identification of closed figures			223, 224, 225, 226, 227,228,305	
		The meaning and identification of solid geometric forms			232-234, 236-237,270-271,272,273, 274,277,278	
		MATHEMATICAL SKILLS				
		Reads and measures angles with a protractor	217-219		230, 231, 306	
		Uses a compass for geometric constructions			229	
MEASUREMENT		COMPUTATIONAL SKILLS				
		Measurement: linear			274,275,276, 291,292,293, 294,295,296, 322	62, 63, 64, 65, 66, 67, 127
		Measurement: temperature			264-265	
		Measurement: liquid			291, 292, 293, 294	